

**Addressing Path Dependency in the Capabilities Approach:  
Historicism and Foresight meet on the Road Less Travelled**

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## **1.0 Introduction**

The chapter challenges the commonly held notion in the capabilities approach, arising out of over emphasis on path dependency, that capability development follows a single path dependent route, which is determined positively by interrelatedness among existing technologies. It queries the fascination especially within the empirical literature with examining a single, successful choice. The chapter argues, like Penrose (1959) and Hamel and Prahalad (1994), that a firm seldom considers only one strategic capability development route. Often, a route is chosen from a bounded option set, anchored by the 'do- nothing' default. This is supported by empirical case evidence, which also suggests that, in some instances, technological interrelatedness is not a major factor influencing the development of capabilities from the available options.

The chapter is structured into five sections: The first section reviews key literature in the capabilities approach (i.e. Barney 1991; Teece, Pisano and Shuen 1997) and describes how, in an attempt to 'engage' with history, path dependency has played a central role in its theoretical construct. It then argues that an attempt by strategy researchers to equate 'serious' engagement with history by using only the notion of path dependency is highly erroneous. In particular, three issues of concern are identified, namely, a myopia in strategic choice, causal bias and, efficiency assumption.

The second section reviews how historians have addressed these problems, with a view to incorporate these suggestions into an empirical study. A key historicist technique is to examine the multiple options that were available before a particular alternative was decided upon and to identify reasons why the others were not pursued. The resulting implications for the capabilities approach are two fold: first, there is a need to acknowledge

the presence of various capability options available to the firm and; second, to also examine why a capability option (i.e. the Road Less Travelled) was ‘not’ pursued (here the emphasis is on juxtaposing alternatives and inductively identifying historical events and factors that led to selection of one option over the others) as opposed to a sole focus upon why an option ‘was’ pursued (here the emphasis is solely on the justification of path dependency and its underlying features e.g., technological interrelatedness, increasing returns, dominant logic etc, associated with the successful choice).

The third section uses this theoretical suggestion to examine capability development in the Dundee Jute Industry (DJI). It addresses the three major concerns with path dependency, illustrating them from the archival-based case studies of firms in the DJI between 1880 and 1970. This phase is divided into three parts: period 1 (1880s-1890s), period 2 (1919-1939), and period 3 (1945-1970). During the first period firms in the industry began to first formulate capability development alternatives, whereas during the second and third period the different options were employed. The section then reflects on the strategic response of the DJI to the growing competition from the Indian industry since the late nineteenth century and the industry’s decline in general.

The fourth section underlines the major findings of the research and emphasises their importance for theoretical development in the capabilities literature. The role of path dependency has been acknowledged also in influencing organisational foresight. Hence, this section outlines key implications arising out of the empirical case for research on organisational foresight.

## **2.0 Path Dependency and Application of History in Capabilities Approach**

### **2.1 Path dependency and Strategic Capabilities**

The significance of path dependency in resource commitment was established by David (1985) and Arthur (1989). David argued that in order to understand the ‘logic or illogic world around us’; it is necessary to understand ‘how it got that way’ (p. 332). He examined the case of the continued preference of the ‘QWERTY’ over the ‘DSK’ format for setting keys on typewriters and computers, when it was demonstrated that the latter form was more efficient than the former. He argued that the combination of three conditions led to this preference: first, the technical interrelatedness of system components, such as typists and keyboards; second, increasing returns, as in the greater value of keyboard systems with larger market shares; and third, quasi-irreversibility of investment, as in the costs of switching from one keyboard system to another owing to ‘learning and habituation’ (p. 336). Building on this framework, Arthur emphasized the importance of increasing returns of scale that developed over time and suggested that these can be derived from both the demand and supply-side. On the supply side the result of learning effects (learning by doing or learning by using), which lower the cost or improve the quality of a product. On the demand side, increasing returns can occur owing to positive network externalities, which raise the value of a product or technique for each user as the total number of user increases.

The notion of path dependency has played an important role in building the theoretical pillars of the resource-based view (RBV), the intellectual root of the capabilities approach. However, the primary aim has been to incorporate history within its framework. Distinguishing the RBV approach from that of the industrial organization (IO) perspectives, Barney (1991) pointed out that the proponents of latter approach examined a

firm's performance independent of its history (p. 107). In contrast to this, the RBV framework gave due importance to the role of history in its analysis. In particular, it played an important role in ensuring the 'imperfect inimitability' of resources through 'path-dependency':

“..this approach asserts that not only are firms intrinsically historical and social entities, but their ability to acquire and exploit some resources depends upon their place in time and space. Once this particular unique time in history passes, firms that do not have space- and time- dependent resources cannot obtain them, and thus these resources are imperfectly imitable” (p. 107-108).

Hence, the role of contextual history in creating path-dependency has been important for researchers examining firm capabilities. As Teece, Pisano and Shuen (1997) noted, 'the notion of path-dependency recognizes that history matters' (p. 522). Path-dependency plays an important role in determining the nature of the capabilities that a firm is able to develop, thus limiting what it can do and where it can go in the future. As Teece et al argued, a firm's 'previous investments and repertoire of routines (its history) constrain its future behavior' (p. 523).

Consequently, the focus in empirical studies, when historical analysis is conducted, has been upon the examination of causes that lead to the path-dependent nature of capabilities at both the industry and firm levels. For example, Klepper and Simons (2000), studied the American television receiver industry from 1945-1989, using a statistically sophisticated model of industry evolution. They found that greater experience in the radio industry acted positively on firm entry and the sustaining of competitive advantage in the

television industry, *thus indicating that existing capabilities help determine successful entry to new related markets*. Similarly, Langlois and Steinmuller (2000) studied the history of the American semiconductor industry from 1980-1995. They examined the industry's general response to the Japanese challenge during this period and found that, although some new capabilities were developed, firms relied heavily on the capabilities that had been developed in the earlier periods, *thereby emphasising the importance of existing technology in determining the nature of capability evolution in the face of international competition*.

Studies at firm level gave relatively greater emphasis to the examination of the historical context, especially within the firm. Nonetheless, their primary aim was to establish path-dependency. For example, Tripsas and Gauetti (2000) examined the company history of Polaroid from its inception in 1937 to 1990, with particular attention to the period from 1980-90, in order to study the relationship between capabilities, cognition and leadership. They found that investment in developing a particular capability was closely related to the dominant belief pattern of its leadership. With the change in leadership came a change in the leader's cognitive beliefs, which in turn led the direction for developing a particular capability. Similarly, Holbrook, Cohen, Hounshell and Klepper (2000) used a case-study approach to examine the company histories of four firms within the American semiconductor industry. They found that each individual firm's commitment to technology and the ability to integrate research and manufacturing were the two major aspects in determining heterogeneity of capabilities and developing unique path-dependency. Consequently, the latter played an instrumental role in the way capabilities were developed in these firms. However, as will be discussed in the next section, this

approach to history in the capabilities literature has been questioned by scholars who have called for a greater attention to history in the strategy literature.

## **2.2 Concerns with Path Dependency**

Researchers have argued that an over emphasis on path dependency has been the result of a ‘narrow perspective’ of history in the strategic management literature (Booth 2003: 99; Clark and Rowlinson, 2004). Although path dependency has made a valuable contribution in terms of fortifying the theoretical underpinnings of the capability approach, it has also led to concerns among researchers resulting from its treatment of history. Booth (2003) and Clark and Rowlinson (2004) have identified three major areas of concern relating especially to the capabilities literature.

*First*, a major implication of path dependency in terms of capability development is ‘lock in’ effect. As current capabilities are considered a result of past investments and future capability developments are a result of current investments, the focus has been on examining factors that lead to the ‘lock in’ (a form of determinism), such as technological interrelatedness, dominant logic and so on, which determine the development of the existing capabilities. Path dependency often underplays the significance of *alternatives* available in history, present, and in future. On the other hand, a distinct theoretical contribution of resource/capabilities approach has been to recognise and underline the importance of management’s ability to leverage their existing resource/capabilities into multiple strategic possibilities (Penrose 1959; Hamel and Prahalad 1994). This is also reflected in practice, where managers often consider more than one option before committing to any particular strategy. Therefore, by giving greater attention to path

dependency related issues, empirical studies have often underplayed the importance attributed to strategic options within the theoretical framework. *Second*, path dependency gives particular emphasis to specific decisions, turning points and events in history that led to the development of current capabilities. Consequently, the ‘flux, continual crisis, and dilemma’ within history are often underplayed in the empirical studies *Third*, in economics, where it was originally applied, the notion of path dependency recognises the inefficiencies in strategic choices as a result of lock-in effects of technological interrelatedness. In strategy, some researchers have made an attempt to theoretically examine this aspect, especially through notions such as ‘core rigidities’ ( ) and ‘strategic liabilities’ (Arend 2004). Yet, within the empirical literature, researchers have to a large extent assumed that the capabilities that are developed as a result of technological interrelatedness are efficient strategy formulations.

To summarise, the notion of path dependency has been an integral part of the theoretical construct of the capabilities approach. Researchers have it mainly to assert the importance of history. In particular, it has helped to underline the uniqueness of a resource/capability, which is specific to a particular firm, thus helping it to maintain its distinctive advantage over competitors. As a result, empirical studies have devoted their efforts to establish the path dependency of a capability by examining the role of determining factors such as technological inter-relatedness in selection of the successful choice. However, an over emphasis on this aspect has led researchers, especially in empirical studies, to underplay an original tenet of the capabilities approach, i.e. the management’s ability to craft multiple strategic options from existing resource/capabilities. This has resulted in an exclusive analysis of critical turning events and an unqualified



assumption that the capability developed as a result of interrelatedness is an efficient strategy. The next section examines how these issues can be overcome through greater engagement with the history literature.

### **3.0 Historicist Approach to Countering Path dependency**

One way to counter the problems of path dependency as discussed above is to give greater attention to the historical context and highlight the multiplicity of choices that were available before a particular course of action had been decided. Usually, firms consider more than one strategic capability development option before they chose a specific one. Therefore, attention should be given to identifying the options that were under consideration and underline why certain options were not pursued. Historians (e.g. Elton 1967 and Carr 1964) have pointed out the importance of this aspect.

For Elton (1967), history is an examination of events in the past that have left deposits in the present. It deals with the happenings, changes and particulars of the events that occurred in the past (p. 24). Hence, the study of history amounts to a ‘search for truth’ concerning these incidents (p. 70). In this endeavor, a ‘professional’ historian’s aim is to get closer to the past and understand the characters ‘until one knows what they are going to say next’ (p. 30). While recreating this past, the determinist tendencies, which arise from a researcher’s aim to justify a researcher’s preconceived theories, must be avoided (p. 64-65). Elton argued that although some form of ‘pattern making’ may be necessary to put forward an explanation, the aim should be to highlight the ‘multifarious and particular’ nature of events (p. 128).

On the other hand, for Carr (1964), the essence of history is in the interpretation of the past as opposed to the pursuit of truth. Carr questioned the over dependence on documents as a source through which to give accurate accounts of historical events. He argued that the content recorded in documents often depended on what the recorder thought had happened, or what he wanted others to think had happened (p. 13). As a result, the interpretation that the historian derives from the records carries greater weight. In order to arrive at a plausible interpretation, the historian is required to gain ‘contact with the mind of those about whom he is writing’ (p. 19). Carr also suggested that history is about the general as opposed to the particular (p. 62) arguing that history is concerned with ‘relation’ between the unique and the general, rather than the precedence of one over the other (p. 65). He acknowledged that in the quest for generalisation, the historian might be faced with the charge of being deterministic (p. 85). However, he questioned the notion that there were limitless possibilities at one’s disposal (p. 87). Every human action is both free and determined to a certain extent (p. 89). Carr quelled the charge of determinism by suggesting that researchers sometimes use rhetorical language to label an event as an inevitable when they want to underline the point that a set of factors would make the likelihood of its occurrence as ‘overwhelmingly strong’ (p. 90). Yet, he acknowledged that in practice, historians are aware of fluxes created by the alternative course of actions that were being considered by the actors:

“In practice, historians do not assume that events are inevitable before they have taken place. They frequently discuss alternative courses available to the actors in the story on the assumption that the option was open, though they

go on quite correctly to explain why one course was eventually chosen over the other” (p. 90).

Notably, Carr did not consider it a high priority to further explore the range of options that were under consideration. He left this job to ‘poets and metaphysicians’ (p. 90). Nevertheless, it is clear that historians from both ‘traditional’ and ‘post-modern’ schools have recognized the presence of multiple options prior to the selection of a course of action. Indeed, the examination of multiple options has received greater attention by historians practicing counterfactual analysis. In underlining the need to examine the various alternatives that were available, Trevor-Roper (1981) argued:

“At any given moment in history there are real alternatives...How can we *explain* what happened and *why* if we only look at what happened and never consider the alternatives, the total pattern of forces whose pressure created the event?” (p. 363)

But not all historians have been receptive to the idea of counterfactual analysis. For instance, Carr (1964) termed the method as being akin to a ‘parlor game’ (p. 91). A major objection has been that counterfactual analysis relies on ‘facts, which concededly never existed’ (Ferguson 1997: 86). In order to counter this, Ferguson suggested that researchers should consider plausible options as ‘those alternatives, which can be shown on the basis of contemporary evidence that contemporaries actually considered’ (p. 86).

Arguably, the use of history to establish path dependency only as an element within its theoretical construct would leave it short of fulfilling the potential that researchers have expected from its use. For example, when Helfat (2000) cautioned strategy researchers by citing the American philosopher George Santayana who remarked ‘those who cannot remember the past are condemned to repeat it’, and Teece et al (1997) argued that ‘history matters’, there was an implicit call for greater attention to the prevailing historical context and the available alternatives. Theoretically, in order to avoid repeating history (assuming that events and lessons indicate issues that are not worth repeating), the first step would be a closer examination of various alternatives that were available during the historical context, so as to be able to make a judgment on exactly what to avoid.

This study examines the strategic options as a means of addressing the three major problems associated with path dependency identified in the earlier section. It does not aim to conduct a detailed counterfactual analysis of strategy options. Its focus is on the identification of the various strategic capability development options available to firms within a specified and localized industry and to examine why they were not pursued. Of course, it is possible that a capability developed by a firm may reflect path dependency. However, initial identification of the option set allows an examination of why a particular capability was developed over the others and highlights the problems or barriers faced in pursuing the rejected options. In addition, by taking this approach, a greater understanding of the historical context is created and a better assessment of the influence of path dependency is possible.

Using this framework, the following sections describe the development of technological capabilities in the DJI between the late nineteenth century and 1970, in order

to counter the growing international competition. In particular, it identifies the strategic options available to firms and the capabilities that were actually developed by four firms<sup>1</sup>- Buist Spinning, Jute Industries (JI), Scott & Fyfe (S&F) and Craiks - between period 2 and period 3. It also identifies factors, which led to selection of one capability development option over the other.

#### **4.0 The Dundee Jute Industry**

Like cotton, jute is a natural fibre. It is grown primarily in the Indian sub-continent, especially in the eastern Indian state of Bengal and Bangladesh. To this day, this region supplies the majority of the world's demand for raw jute. Its cultivation is confined to this region owing to the climatic conditions that are particularly suitable for growing this crop. Although jute was spun and woven by handlooms in India for over two thousand years, it was in Dundee, Scotland, where modern production techniques were first introduced that enabled the industry to achieve its worldwide reputation.

Historically, textile firms in Dundee had used Russian flax as their primary fibre. Jute was introduced in Dundee in the 1820s and 1830s. Initially, the flax manufacturers were not keen to use jute because it was considered an inferior option to flax (Woodhouse and Brand 1934). However, the sudden cessation in the supply of flax from Russia during the Crimean War (1854-1856) left little room for this resistance. Jute provided a cheaper option to flax and the customers also accepted it. Thus, using modern production techniques, the DJI was born. With little international competition, it soon emerged as the

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<sup>1</sup> The primary criteria that governed the selection of cases was the availability of relevant archival data. The case studies represent the cross-section of the industry during this period, in terms of size (small and large), and focus (specialised and generalised). Buist: Small and specialising in spinning. Craiks: Small and specialising in weaving. S&F: Small and specialising in weaving. Jute Industries: Large and generalised.

leading global supplier of jute goods. The industry continued its growth over the second part of the nineteenth century due to both its global monopoly on supply and to a large demand for sand bags during the American Civil War (1861-65) (Carrie 1953). The quantity of imported raw jute gives an indication of the rapid growth of the industry during this period (see Figure 1). Correspondingly, the number of spindles, looms and people employed in the industry expanded significantly (see Table 1).



Figure 1: Source: Howe (1982)

**Table 1 Number of Spindles, Looms and Employed  
between 1870-1890**

	Spindles	Looms	Employed
1870	94,520	3774	14911
1890	268,165	14107	43366

Source: Jute Working Party Report (1946)

#### 4.1 The Rise of Indian Competition and Contraction of the Dundee Jute Industry

Like the UK cotton industry, the jute industry witnessed a dramatic decline from the end of the nineteenth century. By 1944, raw jute imports into the UK had collapsed to less than 25% of their 1896 levels (See Figure 2) and the sector's size ranking had fallen to third in the world.

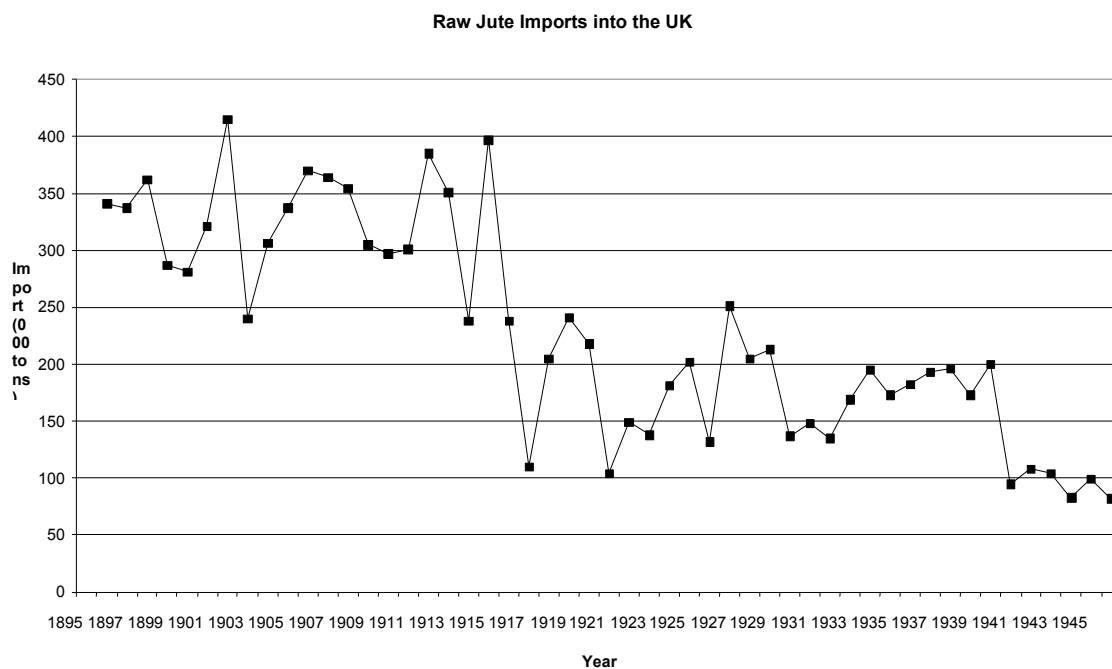


Figure 2: Source: Jute Working Party Report (1946)

The major challenge facing the jute industry up to late nineteenth century was the closing of traditional markets in Europe due to imposition of import tariffs and, more importantly, the rise of competition from the Indian industry. As with the case of continental European countries, tariffs were also imposed by India on the import of jute goods. By 1869, this duty was 7 ½ %.<sup>2</sup> There was a feeling within the Dundee industry that this was less to do with collection of revenue for the state government and more to do with protecting the growing industry in India.<sup>3</sup> As a result, attempts were made to repeal them by making representations to the Indian government directly<sup>4</sup> and later to the Select Committee of the House of Commons on the Indian finances.<sup>5</sup> The industry's petition appeared to have been heard as the tariffs were soon removed.<sup>6</sup> Nonetheless, by the 1890s, the Indian industry had expanded rapidly. By 1882, it had 21 mills, with a total of 5655 looms and 91,000 spindles. And by 1892, the number of mills had increased to 26, with 8101 looms and 162,000 spindles.<sup>7</sup> Hence, growth of competition from the Indian industry was very rapid.

The dramatic growth of the Indian industry was due to the cost advantage that it enjoyed over the Dundee industry. This advantage was a result of three major aspects: a) the Indian industry enjoyed a lower cost of raw material as it was closer to the jute growing region. This closeness eliminated the shipping cost that Dundee had to incur to import jute;

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<sup>2</sup> DCC Minute Book 31<sup>st</sup> March 1869

<sup>3</sup> Ibid

<sup>4</sup> DCC Minute Book 30<sup>th</sup> March 1870

<sup>5</sup> 29<sup>th</sup> March 1871

<sup>6</sup> 3<sup>rd</sup> September 1874

<sup>7</sup> DYB 1892, pp 87



b) the Indian industry also enjoyed the benefit of longer working hours. The extended working hours meant increased production and reduced cost of production owing to economies of scale. While average working time in Dundee was 56 hours per week, the Indian industry clocked up to 84 hours a week, with an average of 72 hours a week<sup>8</sup>; c) the third major advantage stemmed from the lower exchange rate. The monetary instability in the world markets resulting from the demonetisation of silver had devalued the Indian currency significantly. For example, an estimate by the Secretary of the Dundee Chamber of Commerce in 1894 indicated that ‘with the Rupee at 16d, a Calcutta mill could earn a profit of 20 Rupees per ton where a Dundee mill would simply pay expenses, and with the rupee at 12d the profit to the Indian mill would increase to about 53 Rupees, or some 50 per cent’.<sup>9</sup>

By the mid-1870s, the industry in Dundee found itself squeezed between two sides. First, the growth in the Indian industry challenged the DJI in major international markets such as United States, South America, Asia, and Australia and second, high continental European tariffs made it difficult to access major local markets and also gave rise to the growth of industries within these countries. The consequent capacity increase led directly to an excess of global supply with concomitant effects on price. The DJI had to develop a strategic response or face collapse. Its extant capabilities formed the basis for its reaction. The next section describes key capabilities in jute manufacturing.

## **4.2 Capabilities in Jute Manufacturing**

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<sup>8</sup> DYB 1894, pp 96

<sup>9</sup> DCC Minute Book 27<sup>th</sup> September 1894

Like any textile industry using natural fibre, there are three major phases in jute manufacturing: preparation (assorting of raw jute), spinning (making yarn) and weaving (making cloth). Similarly, like any textile industry, jute manufacturing had two major products, yarn and cloth.

In weaving, capabilities can be categorised as the ability to make different widths, lengths, and weights of cloth. Tables 2 and 3 illustrate the different combination of widths and weights required to manufacture a certain type of yarn and cloth. For example, narrower width and relatively heavier cloth was suitable for the traditional sacking and bagging. On the other hand, lighter weight and narrow-width cloth was suitable for scrim cloth, which can be used, in the building industry. However, a wider-width and lightweight cloth is required for linoleum, wall coverings and carpet backing. In yarn, the weight was the major determinant. While the heavier counts went into making sacks and bags, the lighter ones were required for woven carpet yarns. Therefore, the variation in the width and weights in cloth and yarns also helped a firm's entry into new markets.

Table 2 Yarn and Cloth Categories

<b>Yarns</b>	<b>Lbs</b>
Fine	Up to 6
Medium	7 – 16
Heavy	16 – 48
Rove	46 – 1000

<b>Cloth</b>	<b>Inch</b>
Narrow	Upto 56
Medium	57 – 68
Wide	69 and above

Table 3 Major Yarn and Cloth: Type, Product and Markets

	<b>Lbs</b>	<b>Width (Inch)</b>	<b>Weight (Oz- Ounce)</b>
<b>Yarn</b>			
Fine	1.75 to 3	-	-
Carpet Warp	3.5 to 6	-	-
Hessian Warp	7 to 9	-	-
Sacking Warp	8 to 10	-	-
Hessian Weft	7 to 12	-	-
Carpet Weft	14 to 24	-	-
<b>Cloth</b>			
Sacking	-	22 to 30	11 to 24

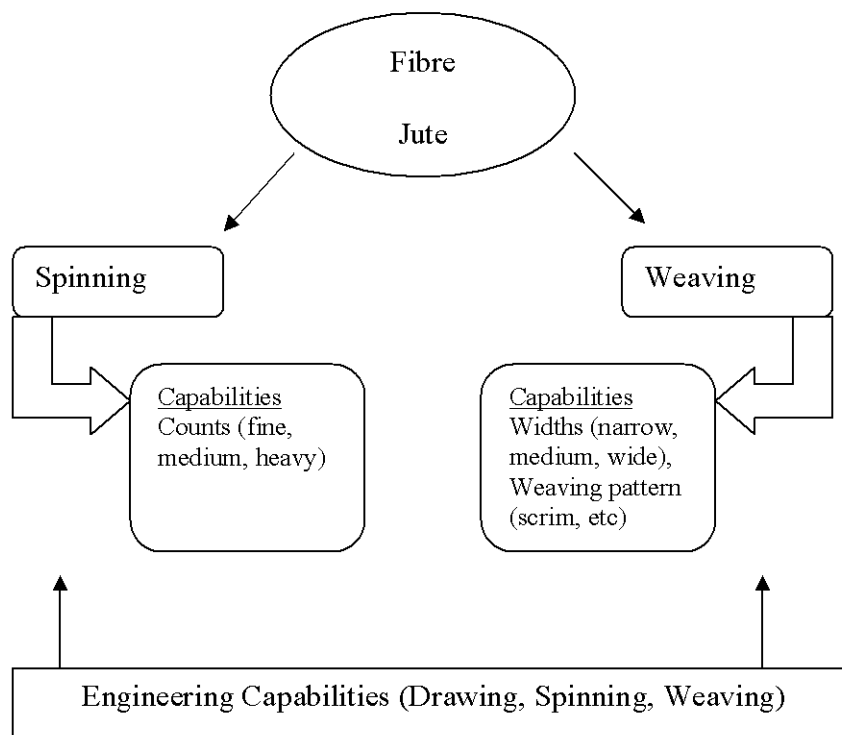
Tarpaulin and Canvas	-	36 to 45	14 to 20
Hessian	-	22 to 80	5 to 14
Scrim	-	28 to 80	5 to 20
Linoleum Backing	-	72 to 84	5 to 9
Carpet Backing	-	150 to 210	5 to 9
Wall Covering	-	40 to 145	8 to 10.5

However, manufacturing cloth of wider widths and yarn of finer qualities required a slightly different process and skills than that required for traditional narrow width cloth and heavy yarns. The traditional looms suitable for making sack and bag cloth were of narrow widths. They could be customized to produce wider width and long length cloth using internal engineering knowledge on existing machines. Traditionally, the machineries for jute manufacturing, including the drawing machine, spinning frames, looms and ancillary parts, were provided by specialised engineering firms. Internal engineering knowledge enables textile firms to make alterations on their own in order to make yarn and cloth of particular weight and width. These engineering skills acted also as an important supporting capability in developing capability in the wide-widths, long lengths and the introduction of new fibre, especially polypropylene. Hence, although a purpose built machine can be bought at market prices from a specialised engineering firm, if a textile firm possesses internal engineering skills, it can carry out modifications to existing machines to enable new fibre adoption faster than rivals and so develop new product, or

adapt existing product, at much lower cost. In spinning, the capability takes the form of ‘counts’, which are broadly categorised into fine, medium and heavy. The Figure 3 illustrates capabilities in the spinning and weaving section of the jute industry.

The following two sections describe how firms within the industry used these capabilities to reposition themselves against the growing international competition between late nineteenth century and 1970.

Figure 3 Jute Manufacturing Capabilities



### **4.3 Dundee's Strategic Repositioning and Capability Options during the late Nineteenth Century**

In order to meet the challenge of growing international competition, the DJI tried to reposition itself strategically in the late nineteenth century. The industry's efforts were guided by the idea of competing in areas where the Indian manufacturers would not be able to challenge them. In order to do so, two major strategic capability development options were being considered within the industry.

First, there was a move to develop capabilities where the Indian industry could not compete. The basis of this argument was that workers in Dundee possessed superior skills in the spinning of yarn and the manufacturing of cloth, with which it was perceived that the Indian workers were not capable of developing. By leveraging their skills, the Dundee manufacturers could develop specialised and higher-class goods, which would fetch them better margins. Particular attention was given to the development of products for the linoleum and carpet industries. In addition, it was also felt that closer contacts with the customers were needed in order to develop 'specialty' products. These fine and specialty products soon provided advantages to Dundee firms. For instance, although the trade was bad during 1892, the specialty products recorded a particularly good turnover over normal types.

The efforts to focus on developing specialised products culminated in the establishment of a Technical School in 1888. It was hoped that besides teaching essential engineering skills for operating spinning and weaving machines, the institute would help in developing valuable skills in textile designs. The suggestion for a technical institute

appears to have first emerged in the mid-1880s. When a question was asked by the Royal Commission about Dundee's efforts to deal with growing international competition, the Dundee Chamber of Commerce could offer no suggestions except point towards the fact that a 'great deal of money was invested in machinery in Dundee, and that it was difficult to alter it'. A suggestion was made to diversify from jute by providing the example of how the ribbon industry in Coventry went into making bicycles after the tariff on French ribbons was repealed in 1860. However, not all firms were prepared to make a 'jump of that sort'. A technical institute, on the other hand, would help the industry to cultivate specialised skills in jute that were necessary to develop capabilities to meet the growing competition.

Although there was a general consensus within the industry that it was important to develop capabilities in areas where the Indian industry could not compete, there was always a lingering threat that the Indian manufacturers would soon catch-up with Dundee in whatever superior capabilities it developed. This was due to the relative technological simplicity in jute manufacturing.

Second, attempts were made to develop capabilities in new fibres. This was driven by the realization that any development within jute would soon be adopted by the Indian industry. By the 1890s, the DJI had become proactive in their search for alternate fibres. In his address to the industry, the local MP, Sir John Leng, acknowledged that if manufacturers 'develop the utmost finer class of goods, and aim at supplying the specialties which the markets of the world continually require', they could meet the challenge of international competition. He also urged them to be on a constant search for 'new varieties and new combination of materials, patterns, and finish.' Suggesting the possibility of

exploring Rhea, a fibre that he had come across on his visit to Asia, he had the following suggestion for the industry:

“....the manipulation of Rhea, which has great possibilities, and which, I believe within a few years will occupy a great position in the world of commerce and manufactures. Where I went in the East I found it was engaging the attention of the most intelligent and far-seeing men, and I saw and heard so much that if I were the head of a great manufacturing firm I would at once set aside 50,000 to 100,000 yards to thoroughly test the capabilities both of the Eastern production and British manufacture of their most promising fibre.”<sup>10</sup>

#### **4.4 Strategic Repositioning and Capabilities between 1919-1939 and 1945-1970**

The examination of selected case studies suggests that firms responded to the growing international competition during the two periods 1919-1939 (Period 2) and 1945-1970 (Period 3) by repositioning themselves strategically through the development of two broad sets of capabilities, within jute and with new fibre.

During period 2, the competition from the Indian industry was limited to the ‘standard’ sack and bag market and narrow width cloth. The examination of Buist and JI during this period indicates that these firms had consciously decided to move away from the areas where Indian competition was getting intense. The case of JI indicated that, in weaving, firms built capabilities in wide-width, lighter weight and long rolls of cloth. These

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<sup>10</sup> Dundee Advertiser, 8<sup>th</sup> April 1896



were used mainly as backing cloth for linoleum. On the other hand, the case of Buist suggested that, in spinning, this corresponded to capability in medium and fine qualities of yarn for carpet yarns and yarns for lighter weight jute cloth that were being developed by weaving firms. Therefore, during this period, the repositioning was limited to entering new markets by developing further capabilities in jute. But this strategy was limited to only a few firms, while others stuck to their capability in narrow-width cloth and continued to operate in the traditional markets.

However, during period 3, a two-pronged repositioning strategy and capability development strategy was followed in both jute and new fibre. Up to the 1950s, a large part of the industry that had continued to operate in the traditional sack and bag market during the period 2, began to specialise and enter new markets. For example, S&F, after operating in the traditional narrow-width sack and bag market during this time, began to build its capability in the 1950s in wide-widths and long lengths. On the other hand, firms that had already specialised during period 2, found new product applications. For example, JI was one of the few firms that had already built a substantial capability in wide-width cloth that was used as a backing cloth for linoleum (a floor covering) by the end of period 2. During the 1950s, JI leveraged its capability in wide-width to develop carpet backing cloth. Besides specialisation in jute, firms also began to introduce new fibres during the period 3. For example, Craiks introduced cotton immediately after the end of the Second World War and, by the 1950s, half of its production was in cotton and synthetics. JI also made such strategic forays, with the establishment of paper sack and bags manufacture. However, until the second-half of 1960s, the new fibres were not adopted widely within the industry though they grew dramatically thereafter.

The general strategy of repositioning into new markets and the importance of capability in wider widths and finer yarns is also supported by Whately (1992), in his company history of the firm Don Brother Buist Ltd. Whately found that during period 2, owing to growing competition from the Indian industry in the ‘standard goods’ (i.e. sacks and bags), Dons were ‘very much in the forefront of the search for markets for non-standard goods’ (p. 179). The majority of the firm’s looms at this moment were in narrow-widths that were found to be ‘too narrow for the contemporary market’ (p. 181). In their effort to enter into specialised markets, Dons went on to build their capability in medium and wide widths up to 80” by the mid-1930s (p. 181). During period 3 Dons were able to leverage these capabilities further (p. 196). However, as illustrated in the next section, the development of new capabilities in jute and new fibres was constrained by certain critical barriers.

#### **4.5 Barriers to Strategic Repositioning and Capability Development**

A major aspect of this research is to identify factors that played a part in a particular capability option that was not adopted. The jute industry faced options in developing capability within jute and for new fibres. The importance of these options was prominent during two key phases, period 1 and 3. An exploration of the factors that led the industry to develop its capability within jute, rather than new fibre, in period 1 and 2, and vice versa in period 3, will help to illustrate the contextual barriers that firms faced.

##### **4.5.1 Period 1 and 2(1880s-1945)**

This is the first period when strategic capability options were created in order to counter growing international competition. Between the two alternatives, jute and new fibre, firms concentrated their efforts on developing capabilities in the former until 1945.

Trials conducted with new fibres, especially with Ramie, between 1880s and 1890s highlight two major factors that acted as barriers in building capability in this area. The first was the unsuitability of new fibres to existing jute machineries and required new machinery and processing techniques. However, with some modifications to the machines, the fibre could be manufactured to a satisfactory quality.

Second, it transpired that the cost of manufacturing this fibre was higher than that of jute. Between the two, the second issue had a greater implication than the first one. It is important to appreciate the industry's concern for price sensitivity when introducing new fibres. The cheapness of jute was one of the major factors in its substitution of flax. Therefore, the matter of cost would be a major issue if a new fibre was to replace jute. Furthermore, jute had been able to maintain its dominance in the world markets due to its cheapness.

During the period 2, the industry was unable to find a cheaper fibre than jute. For example, when a sample was sent to JI in 1928, its Director termed the fibre as being 'too good' for them. As a result, firms continued to build their capability in jute as part of the strategic response. But the potential of capabilities in jute to counter international competition declined dramatically during the period 3 leading to the importance of developing capabilities in new fibre, as discussed in the following section.

#### **4.5.2 Period 3 (1945-1970)**

The second period when the strategic capability options became important within the DJI was after 1945. Several forces determined the future pathway:

#### **a) Limitations with the Attributes of Jute**

During period 3, developing further capabilities in jute beyond the recent innovations in wide-widths and long lengths proved to be a major challenge. The coarse nature of the fibre and cheapness in price were the two most important features that had enabled jute to replace flax in Dundee during the Crimean War in the 1850s. But these physical properties meant that jute was not accepted widely beyond its traditional markets. For example, in an effort to promote the awareness of jute and its uses, the DJI had marketed jute as a versatile fibre, having around 101 applications. However, almost all these applications were in the industrial market. In these markets, jute had very little competition from other fibres due to its durability and cost. However, its coarseness was a major constraint in entering consumer markets, where finer and softer fabrics were needed e.g., wall coverings. Recalling the problems faced in carrying out further innovations in jute during the between 1945 and 1970, Mr McKay, the Head of Research Department at Jute Industries and a Research Committee member of the British Jute Trade Research Association<sup>11</sup>, observed:

“Unfortunately, the mere nature of the fibre limited the scope. I mean if it was exposed to sunlight it would rot away, so from that point of view its durability.

But on the other side, the fibre itself limited to the extent you could produce lighter yarns, because beyond a certain point it is not possible because of the

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<sup>11</sup> The BJTRA was established in 1947 with an aim to foster research within the Dundee jute industry. It was jointly funded by the Government and the industry.

coarseness of the fibre- unlike cotton- so you were faced with, relatively speaking, bulky yarns because you could not get it down to anything really fine. And even had you succeeded in doing that, the applications were fairly limited. There is a certain restriction on development because of the nature of the fibre itself.”<sup>12</sup>

However, these limitations were not just prevalent during the 1950s and 60s, but persist even to this day. Mr Atkinson’s reflection on the outcome of major research institutes (including Dundee, India and Bangladesh) gives a startling insight into the developments in machinery, processing and the application of jute since the 1950s:

“...you had the jute research institute working from about 1950 till 1974 or whenever it folded up; 20 years. And nothing came out of it. You’ve got the Indian research institute, which has been working longer. Nothing of significance has come out. You’ve got the Bangladesh institute working from 1960s into the present being. Nothing has come out of it. Yes all right, minor things here and minor things there, little bits and pieces. But there has been no wholesale redevelopment of the process. The process today is exactly the same as it was in the 1890s. Fundamentally it’s the same. The machines have changed slightly; they are going a little bit faster now. But it’s been fundamentally the same. There has been no significant change there. And equally there has been no market of any size developed, despite about 150

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<sup>12</sup> Interview with Mr Sandy McKay

research years. It's rather sad but I think it just means that jute is ideal for sacks and bags. Finish. Full stop.”<sup>13</sup>

By 1939, it seemed that jute had reached the limit of its technological development and stood at the top of its S-curve. Physical properties restricted progress severely. With the dismantling of protection under the Monopolies Act during the early 1960s, international competition again posed a serious challenge. In this context, the importance of a new fibre became paramount to the industry's survival.

#### **b) Significance of New Fibre**

While attempts were made to find a new fibre after 1945, these had begun as far back as the 1880s-1890s. Surprisingly, by the end of the 1950s, no new fibres were adopted widely within the industry. The Pilmott Committee Report in 1959 on the 'Future of the Jute Industry' found that only a handful firms had begun using new alternates. As Table 4 below indicates, of the total 57 firms surveyed, 38 firms were wholly dependent on jute. Of the remaining, only 9 firms were using synthetic fibres to some extent (largely rayon, with 2 firms also using nylon), 2 firms were using wool, 1 firm was making paper and felt, 1 firm had diversified partly into engineering, 3 firms were engaged in carpet and brattice cloth, and 1 firm in flax. Only 1 firm had completely changed over from jute to rayon.

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<sup>13</sup> Interview with Mr R R Atkinson

**Table 4 Number of Firms in Jute and Other Fibres**

	<b>Wholly on Jute</b>	<b>Mainly on Jute</b>	<b>Jute and Other products</b>	<b>Formerly on Jute</b>
<b>Number of firms</b>	38	8	11	1

Source: Pilmott Committee Report, 1959

Among the firms that were using new fibres, the majority of them had introduced Rayon. Rayon is a fine fibre and has a feel and texture akin to that of cotton, silk linen and wool. Owing to its fineness, Rayon is widely called an ‘artificial silk’. Therefore, it was more suitable for the markets where fineness of yarn / cloth was of paramount importance. In the cloth side, it was more suited for the apparel and furnishing markets. It was not particularly suitable for the traditional jute markets of sacks, bags, and backing cloths where the emphasis was on the coarseness of the fibre. With properties similar to that of cotton, it could also be processed on looms such as the Northrop, which was primarily made for weaving cotton. The Rayon yarn was more suitable for pile yarns<sup>14</sup>, which were required to have a softer feel. Jute, on the other hand, was used as a weft yarn<sup>15</sup>, which was required to be of tougher build. Consequently, Rayon could not be used to replace jute as a weft yarn. Therefore, Rayon was more suitable for firms that had moved away from the traditional industrial markets of jute into the apparel and furnishing industry. This could explain why, during the period 3, Craiks, who had entered into furnishing market with the

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<sup>14</sup> Pile Yarn: This yarn, cut or looped, is projected from the substrate and acts as the use-surface.

<sup>15</sup> Weft Yarn: This yarn is laid out horizontally to hold together the entire construction of the carpet.

introduction of cotton, laid greater emphasis on Rayon than Scott & Fyfe, who continued to operate in the industrial market.

However, it was not until the introduction of Polypropylene in the mid 1960s that any serious replacement for jute was found. This replacement was used in traditional jute markets and proved economically viable. Comparing this new fibre with other fibres, the industry had tried previously, Dr Stout, Director of Research at Scottish Textiles Research Association (formerly BJTRA) noted:

“What is the future? Polypropylene tape is the first synthetic material to challenge jute both on technical merit and price. It is likely to be the first of many challenges. So research work must keep well ahead of commercial development.”<sup>16</sup>

Polypropylene had three major technical advantages over jute in traditional products. First, jute was prone to rotting if used in damp conditions. Second, jute being a biodegradable fibre, tended to lose its colour and texture if it was exposed to sunlight for an extended period of time. Being a synthetic fibre, Polypropylene was able to overcome these two limitations of jute. Third, in the process of making tufted carpets-a primary market for jute, the jute primary backing cloth was highly prone to breaking needles that were inserted in it. When needles were punched through it, they tend to get brushed aside. On the other hand, Polypropylene fabric was an ‘acceptor’ of needles. As the needle was punched down, the fabric would spread around it. As a result, the pile was placed much closer to where it was intended to be. On the other hand, the fibrous nature of jute provided

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<sup>16</sup> ‘Adding another string to the textile bow’, Newspaper cutting from Glasgow Herald, 25<sup>th</sup> August 1969

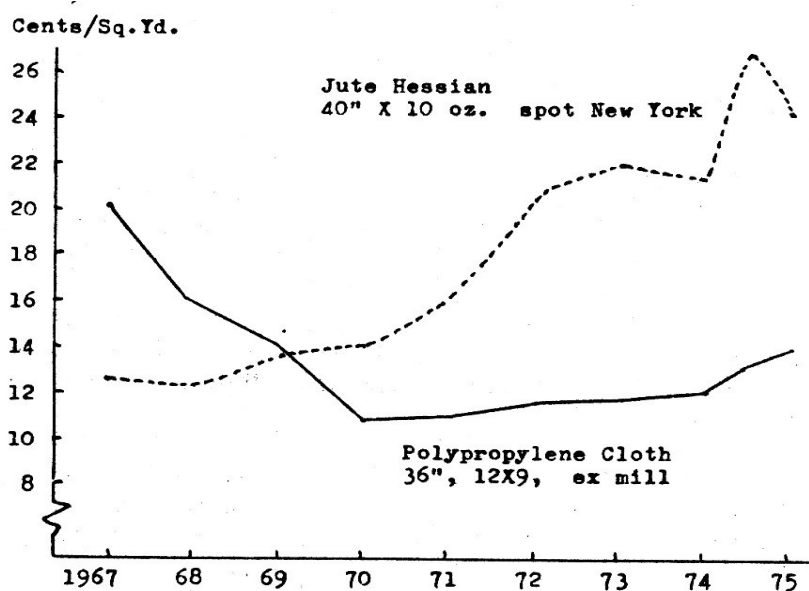


a better 'bond' than polypropylene for the backing of tufted carpet (McKay 1973). However, in order to overcome this, latexing was introduced to achieve better bonding between the Polypropylene backing and the carpet pile. Other aspects such as less waste in production and relative stability in raw material's supply and prices also combined to make Polypropylene an attractive option to jute.

Besides being technically superior, Polypropylene was also cheaper than jute, at-least during the late 1960s. The fluctuation in the price of raw jute in the late 1960s had led to a significant price increase in jute goods, making Polypropylene cheaper than jute. The Figure 4 shows the dramatic increase in price of jute cloth on the one hand and a fall of polypropylene cloth on the other. The relative cheapness of polypropylene played a major role in this new fibre being adopted widely by the industry.

Figure 4 Polypropylene resin, Jute Hessian and Polypropylene Cloth Equivalent Prices

1964-74 (actual) 1975 (estimated): McDowell and Draper (1978)



As discussed, there were limitations associated with the physical characteristics of jute. Therefore, initiating further development work was very difficult, if not impossible during the period 3. The 'latest' development, i.e. backing cloths for tufted carpets, was also under threat from Indian competition, once protection was lifted in the 1960s. The industry therefore faced a 'squeeze' whereby at one end, low cost based competition was looming and at the other end, the limiting properties of jute imposed further capability development constraints.

Under these circumstances, the introduction of a new fibre was viewed within the industry as a possible strategic option. If a new fibre could have been applied in the existing industrial market, it would have given the industry a chance to move away from the Indian industry's jute-based competition. Therefore, the replacement of jute by a new fibre should not be viewed as a 'threat' or 'death knell' for the 'jute' industry, but a necessity through which the Dundee 'textile' industry could continue to survive. Guldie (1987) supports this notion and has drawn a parallel between the introduction of jute and Polypropylene and suggested that 'the coming of jute was as inevitable as the replacement by Polypropylene' (p. 125).

Why did it take the industry until the 1960s to introduce it? An initial analysis points to both physical and cognitive 'lock in' effects. The physical properties of the fibre and its relative cost advantage restricted its use to industrial markets in the main. The characteristics of jute limited further developments within jute, which meant that it was difficult to apply it to other more lucrative global markets e.g., consumer goods. In addition, the relative cheapness of jute meant that it was tough to find another fibre to

match the commercial and technological qualities of jute to replace it in the traditional markets. The second explanation is cognitive. MacKay, Masrani and McKiernan (2006) have argued that a ‘jute’ mentality dominated thinking within the sector. Its intensity and symbolism were reflected and reinforced in local committees, institutes, supply chains, press and research papers. For instance, since the introduction of jute in 1850s, the industry was widely known by its supply side raw material, as the ‘Dundee Jute Industry’, rather than by demand side customers it served in the industrial markets e.g., the packaging industry. As a result, the innovations, both products and process, were mainly within jute (p. 935-936). Had the industry perceived itself as a ‘packaging’ industry, it could have avoided locking itself into jute only innovations and could have been more vigorous in its search for new fibres (p. 936). These two explanations are not necessarily mutually exclusive. In fact, it is also possible that the cheapness of jute and the inability to find any other fibre to replace it could have led to the belief within the industry that ‘jute is king’ and is irreplaceable.

## **5.0 Conclusion**

This study has made an attempt to address the three major problems associated with path dependency in the capabilities literature: a) it examined the strategic options and reasons why some options were selected over others. b) it gave emphasis to the on-going flux and crisis in selecting the capability alternatives and; c) it queried the predominant belief that the capabilities actually developed formed the most efficient strategy.

Clearly, the pattern of capability development in the DJI during period 2 and 3 that was generated to counter growing international competition can be explained by the traditional path dependency related aspects such as technological interrelatedness. For example, firms developed capabilities in jute wide-width cloth and jute finer yarns by making use of their existing capabilities in jute. But assuming that, because of technological relatedness, the further development of capabilities within jute was the only option considered by the firms within the industry would be incorrect. As this study has found, the firms also considered the possibility of developing capability in a new fibre (the Road Less Traveled) as early as the 1880s and again after the end of the Second World War. Nonetheless, the inability to find a fibre with technological and commercial viability to replace jute in its traditional markets played a major role in selecting the jute capability development option over the new fibre option. But when firms were able to develop capability in a new fibre, as with Polypropylene, the significance of developing capability in jute declined dramatically. This study made an attempt not to limit the examination to a single event or turning point as a dominant factor in influencing capability development. As a result, the findings of the study have been able to illuminate the constant flux and dilemmas pertaining to the selection of strategic capability options. Yet, it is evident from the case study that, in the long term, the further development of capabilities within jute was not the most efficient option in order to counter growing international competition. Though, it offered some support in the medium term, this became tough to sustain and the DJI collapsed finally during the 1980s.

This chapter has argued that the attribution of the development of a particular capability only to path dependency and its determinant factors such as technological

interrelatedness does not lead to a full understanding of the historical context within which the capabilities are developed. Such myopia robs the analysis of knowledge of the range of options available to a firm and an opportunity to gain deeper understanding as to why a particular capability was pursued over others. This can be addressed by following a two pronged strategy: first, through the identification of strategic capability development options that were being considered by the firm before committing to a particular capability and second, through the juxtaposition of alternatives and the examination of the reasons why certain alternatives were discarded. In particular, an investigation of the role of factors other than those traditionally related to path dependency would shed fresh light on the issue. In this context, the role of agency in influencing the rejection, or selection, of particular capability development option offers a possible avenue for future research. The capabilities literature should make, and note, the greater concentrated attempt to engage with history. This chapter made a concerted attempt to engage with history within the strategy literature illustrating that there is a great scope for the use of historicist methodology to gain a better understanding of firm strategies.

The findings of this study have several implications for research on foresight. First, sectors exhibit a patterning throughout history whose signatures are repeated in the present. These case studies illustrate that ‘not much is new’ in strategic terms in modern industries that was not replicated at some stage in past sectors. For example, the events and crises in the DJI and have a parallel in history of the UK Cotton Industry (for example, see Rose 1990; Singleton 1991) and can be witnessed in any study of UK car production from 1945 to 1985. Hence, a methodical study of firm and industry histories can help to put the present and future into context. Second, firms can confuse a path dependent option with a best way

forward. Cognitive freezing coupled with asset specificity can cause ‘lock in’ and an ignorance of other options in the set which may have more sustainable future pathways. In practice, these might be left under-explored and thus presented as ‘straw’ options in comparison to the ‘locked’ version. Consequently, due diligence is damaged and foresight restricted. Finally, as this study has indicated, components of strategy, which may appear to be less suitable in the present, could very well become an integral part of the future. The fuller exploration of capability options can benefit from techniques of scenario modelling. This will assist in the systematic appraisal of their future planning and may lead to a more informed choice.

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